

WHAT IS CLAIMED IS

1. A roadway communication system comprising a plurality of road transmission antennas, and a vehicle mounted device receiving electromagnetic waves radiated  
5 from the road transmission antennas,

wherein the road transmission antennas are disposed at different places along a road and each radiate the same cell with the waves carried at the same frequency and containing the same content, and

10 wherein the vehicle mounted device comprises vehicle reception antennas having different directivities for receiving the waves radiated from the road transmission antennas, and diversity reception means for performing diversity reception using these  
15 vehicle reception antennas.

2. The roadway communication system of Claim 1, wherein the vehicle mounted device further comprises reception-level detection means for detecting a reception level of each directive wave received by the  
20 vehicle reception antenna, and

wherein the diversity reception means performs the diversity reception based on the reception level detected by the reception-level detection means.

3. The roadway communication system of Claim 1,  
25 wherein the diversity reception means performs either

of the following operations for the diversity reception:

(a) an operation of switching or combining the signals which were received by the vehicle reception antennas and are to be decoded; and

5 (b) an operation of switching or combining the codes which were received by the vehicle reception antennas and then decoded.

4. The roadway communication system of Claim 1, wherein the vehicle reception antennas are an array  
10 antenna, whereas the vehicle mounted device further comprises reception-signal detection means for detecting a reception level or phase of the wave received by each of the vehicle reception antennas, and

wherein the diversity reception means performs the  
15 diversity reception using information on the reception level or phase detected by the reception-signal detection means.

5. The roadway communication system of Claim 1, further comprising a signal transmission unit for  
20 transmitting signals modulated with data of the same content to the road transmission antennas via a plurality of transmission lines, wherein an optical fiber radio signal transmission system is used as a transmission system for outputting the signals to the transmission  
25 lines.

6. The roadway communication system of Claim 1 or 5, wherein Orthogonal Frequency Division Multiplex (OFDM) modulation technique in which a guard time is provided at each symbol is used as a data modulation technique.

5 7. A roadway communication system comprising a vehicle mounted device, and a plurality of road reception antennas for receiving electromagnetic waves radiated from the vehicle mounted device,

wherein the vehicle mounted device comprises  
10 vehicle transmission antennas for multiple direction radiation of electromagnetic waves modulated with vehicle data, and

wherein the plural road reception antennas are disposed at different places along a road as providing  
15 directivity to the same cell, and include diversity reception means for performing diversity reception based on the signals received by the road reception antennas.

8. The roadway communication system of Claim 7, further comprising reception-level detection means for  
20 detecting reception levels of the plural road reception antennas,

wherein the diversity reception means performs the diversity reception based on the reception level detected by the reception-level detection means.

25 9. The roadway communication system of Claim 7,

wherein the diversity reception means performs either of the following operations for the diversity reception:

(a) an operation of switching or combining the signals received by the road reception antennas; and

5 (b) an operation of switching or combining the codes which were received by the road reception antennas and then decoded.

10. The roadway communication system of Claim 7, further comprising a signal reception unit for receiving,  
10 via transmission lines, the signals received by the road reception antennas,

wherein an optical fiber radio signal transmission system is used as a transmission system for transmitting the signals through the transmission lines.

15 11. The roadway communication system of Claim 7, wherein the vehicle mounted device uses Orthogonal Frequency Division Multiplex (OFDM) modulation technique, as a data modulation technique, in which a guard time is provided at each symbol.

20 12. A roadway communication system comprising a plurality of road transmission antennas and a vehicle mounted device receiving electromagnetic waves radiated from the road transmission antennas,

wherein the road transmission antennas are  
25 disposed at different places along a road and each

radiate the same cell with the waves carried at the same frequency and containing the same content,

wherein a position marker is disposed at or near the road for informing a position on the road at which  
5 reception levels of the waves radiated from the plural road transmission antennas are switched, and

wherein the vehicle mounted device comprises vehicle reception antennas having different directivities for receiving the waves radiated from the  
10 plural road transmission antennas, marker detection means for detecting an arrival of the vehicle at the position marker, and reception means performing any one of the following operations a-c in response to the marker detection means detecting the arrival of the vehicle at  
15 the position marker:

- (a) an operation of switching the directivities of the vehicle reception antennas using phase control,
- (b) an operation of switching or combining the signals received by the vehicle reception antennas, and
- 20 (c) an operation of switching or combining the codes which were received by the vehicle reception antennas and then decoded.

13. A roadway communication system comprising a plurality of road transmission antennas, and a vehicle  
25 mounted device receiving electromagnetic waves radiated

from the road transmission antennas,

wherein the road transmission antennas each have a specific polarization characteristic and radiate the same cell with the waves carried at the same frequency  
5 and containing the same content, and

wherein the vehicle mounted device comprises a plurality of vehicle reception antennas having different polarization for receiving the waves radiated from the road transmission antennas, and diversity reception  
10 means performing diversity reception using the vehicle reception antennas.

14. The roadway communication system of Claim 13, wherein the vehicle mounted device further comprises reception-level detection means for detecting reception  
15 levels of the waves received by the vehicle reception antennas on a polarization-characteristic basis, and

wherein the diversity reception means performs the diversity reception based on the reception level detected by the reception-level detection means.

20 15. The roadway communication system of Claim 13, wherein the diversity reception means performs either of the following operations for the diversity reception:  
(a) an operation of switching or combining the signals which were received by the vehicle reception antennas  
25 and are to be decoded; and

(b) an operation of switching or combining the codes which were received by the vehicle reception antennas and then decoded.

16. The roadway communication system of Claim 13,  
5 wherein the vehicle reception antennas are a polarization array antenna whereas the vehicle mounted device further comprises reception-signal detection means for detecting a reception level or phase of the wave received by each of the vehicle reception antennas,  
10 and

wherein the diversity reception means performs the diversity reception using information on the reception level or phase detected by the reception-signal detection means.

15 17. The roadway communication system of Claim 13, further comprising a signal transmission unit for transmitting signals modulated with data of the same content to the road transmission antennas via a plurality of transmission lines, wherein an optical fiber radio  
20 signal transmission system is used as a transmission system for outputting the signals to the plural transmission lines.

18. The roadway communication system of Claim 13 or 17, wherein Orthogonal Frequency Division Multiplex (OFDM)  
25 technique in which a guard time is provided at each symbol

is used as a data modulation technique.

19. A roadway communication system comprising a vehicle mounted device, and a plurality of road reception antennas for receiving electromagnetic waves radiated  
5 from the vehicle mounted device,

wherein the vehicle mounted device comprises vehicle transmission antennas with different polarization characteristics for radiating electromagnetic waves modulated with vehicle data,

10 wherein the plural road reception antennas each have a specific polarization characteristic and are disposed to provide directivity to the same cell,

wherein the road reception antennas each comprise diversity reception means for performing diversity  
15 reception based on the signals received by the road reception antennas.

20. The roadway communication system of Claim 19, further comprising reception-level detection means for detecting reception levels of the plural road reception  
20 antennas on a polarization-characteristic basis, and

wherein the diversity reception means performs the diversity reception based on the reception level detected by the reception-level detection means.

21. The roadway communication system of Claim 19,  
25 wherein the diversity reception means performs either



of the following operations for diversity reception:

(a) an operation of switching or combining the signals received by the road reception antennas; and

(b) an operation of switching or combining the codes  
5 which were received by the road reception antennas and then decoded.

22. The roadway communication system of Claim 19, further comprising a signal reception unit for receiving, via transmission lines, the signals received by the road  
10 reception antennas, and

wherein an optical fiber radio signal transmission system is used as a transmission system for outputting the signals to the transmission lines.

23. The roadway communication system of Claim 19,  
15 wherein the vehicle mounted device uses Orthogonal Frequency Division Multiplex (OFDM) modulation technique, as a data modulation technique, in which a guard time is provided at each symbol.

24. A roadway communication system comprising a  
20 plurality of road transmission antennas, and a vehicle mounted device receiving electromagnetic waves radiated from the road transmission antennas,

wherein the road transmission antennas are disposed at different places along a road, each antenna  
25 having a specific polarization characteristic and

radiating the same cell with the waves carried at the same frequency and containing the same content,

wherein a position marker is disposed at or near the road for informing a position on the road at which reception levels of the waves radiated from the road transmission antennas are switched, and

wherein the vehicle mounted device comprises vehicle reception antennas having different polarization characteristics for receiving the waves radiated from the road transmission antennas, marker detection means for detecting an arrival of the vehicle at the position marker, and reception means for performing any one of the following operations a-c in response to the marker detection means detecting the arrival of the vehicle at the position marker:

(a) an operation of switching the polarization characteristics of the vehicle reception antennas using phase control;

(b) an operation of switching or combining the signals received by the vehicle reception antennas; and

(c) an operation of switching or combining the codes which were received by the vehicle reception antennas and then decoded.

25. A roadway communication system comprising a plurality of road transmission antennas, and a vehicle

mounted device receiving electromagnetic waves radiated from the road transmission antennas,

wherein the road transmission antennas are disposed at different places along a road and each  
5 radiate the same cell with OFDM (Orthogonal Frequency Division Multiplex)-modulated wave containing the same content,

wherein the vehicle mounted device comprises a vehicle reception antenna for receiving the waves  
10 radiated from the road transmission antennas, and reception means for demodulating the waves received by the vehicle reception antenna.

26. The roadway communication system of Claim 25, further comprising a signal transmission unit for  
15 transmitting signals modulated with data of the same content through a plurality of transmission lines to the road transmission antennas, wherein an optical fiber radio signal transmission system is used as a transmission system for outputting the signals to the  
20 transmission lines.

27. The roadway communication system of Claim 25 or 26, wherein Orthogonal Frequency Division Multiplex (OFDM) modulation technique in which a guard time is provided at each symbol is used as a data modulation technique.

25 28. A roadway communication system comprising a

vehicle mounted device, and a plurality of road reception antennas receiving electromagnetic waves radiated from the vehicle mounted device,

wherein the vehicle mounted device comprises a  
5 vehicle transmission antenna for radiating waves which are OFDM (Orthogonal Frequency Division Multiplex)-modulated with vehicle data, and

wherein the plural road reception antennas are disposed at different places along a road as providing  
10 directivity to the same cell and each include road reception means for performing demodulation using a signal received by the road reception antenna.

29. The roadway communication system of Claim 28, wherein the road reception antenna uses an optical fiber  
15 radio signal transmission system for outputting the received signal to a transmission line to the road reception means.

30. The roadway communication system of Claim 28, wherein the vehicle mounted device uses OFDM modulation  
20 technique, as a data modulation technique, in which a guard time is provided at each symbol.

31. The roadway communication system of any one of Claims 1 to 30, wherein the plural road transmission antennas each define an individual one of plural  
25 sub-areas which are constituting a single cell.

32. The roadway communication system of any one of Claims 1 to 31, wherein communications are carried out over a plurality of continuous cells, using signals at the same frequency and of the same content.

5 33. The roadway communication system of any one of Claims 1 to 32, wherein the plural road transmission/reception antennas are disposed near a cell boundary with respect to a longitudinal direction of the road.